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SUNDAY, MAY 11, 1902.

Editorial Reception-Room.......Park 156

CIRCULATION DURING APRIL.

Charles W. Knapp, General Manager of The St. Louis full and complete copies of the daily and Sunday Republic printed during the month of April, 1902, all in regular editions, was as per schedule below:

Date.	Copies.	Date.	Cobies
1	108,740	16	109,640
2	108,770	17	111,010
3	108,930	18	111,060
4	108,830	19	113,290
5	111,630	20 Sunday	117,780
6 Suaday	116,180	21	112,050
7	108,940	22	111,850
8	109,610	23	111,110
0	109,550	24	111,700
10	109,620	25	112,560
11	109,790	26	113,650
12	111,760	27 Sunday	117,590
13 Sunday	117,260	28	111,420
14	110,460	29	112,130
15	110,830	30	112,030
Total fo	or the mosth		3,349,770

Less all copies spoiled in printing, left over or

And said Charles W. Knapp further says that the number of copies returned and reported unsold during the menth of April was 12.9 per cent.

CHARLES W. KNAPP. Sworn to and subscribed before me this 50th day of

64.945

J. F. FARISH, Notary Public, City of 3t. Louis, Mo.

My term expires April 26, 1906.

The St. Louis carrier force of The Republic celiver more than 53,000 copies every day. This is nearly four times as many as any other morning newspaper delivery in St. Louis and more than twice as many as any morning or evening

WORLD'S-1904-FAIR.

MISSOURI PARK AND CARNEGIE LIBRARY. With the purchase of the old Exposition property by the Union Trust Company, trustee for the St. Louis Public Library, it is made certain that the Exposition site will again become a downtown park, with the ing a portion of its space.

The entire community is to be congratulated upon this great acquisition for the general benefit. The Exposition has outlived its usefulness. The Carnegie Central Library in its place, surrounded by beautiful park grounds open to the public, will be of infinitely more value to all the people. The St. Louis Public Library, so potent an educational force in its daily infinence, will be vastly strengthened and far more competently equipped for its good work.

The generous and public-spirited gentlemen composing the Board of Directors of the Union Trust Company, the former Board of Directors of the old Exposition Company, the management of the Public Library and other liberal citizens deserve the community's thanks for financially contributing to make possible the purchase of the old Exposition site. They gave the money necessary for the purchase, some \$280,000 in all, of which the Union Trust Company directorate subscribed \$250,000. They have done a notable deed for the good of the entire community. The spirit which prompts such deeds is that of the highest civic

GROWTH OF LIBERALITY.

What an uproar would have been raised half a century ago had a company of Rabbis suggested that the Christian Sunday be adopted as the day of rest among the Jews. Though for the past few centuries Jews have less and less strictly held to their day, the idea of making Sunday the recognized day of rest has never seemed so near adoption.

If the tenor of the remarks which were made at the Central Conference of Jewish Rabbis in New Orleans may be taken as indicative of the general sentiment among modern Jews, the day is not far distant when the last day of the week will be abandoned in the hope that greater good may be done by conforming to material conditions and observing the first day as the day of abstinence from business.

It must be granted that this is a great advance in fiberal opinion over views held in comparatively recent years. Yet it is not peculiar to the Jews. If they have become convinced that the ends of religion may be served better by changing the forms, if not the substance, they have only followed the trend of modern day utilitarianism.

No other sect will be able to criticise this movement among the Jews. The other day a body of Presbyterian ministers sitting in New Jersey to pass has been signalized by a respectful consideration on on the qualifications of a candidate for the ministry were apparently shocked to hear him say that the first man was not the individual Adam. The Presbytery adjourned for a month in order to give an opportunity to the candidate to change his views. He was ob- acquainted with the people in a way to command durate, citing the text in defense of his position. When the Presbytery reconvened the young man said that, though he believed himself right, he would promise not to express his opinions in public on that ques

tion. With this proviso, he was ordained. None will say that the man stultified himself in promising to refrain from discussing the priority of Adam's existence over other men. Here is an appreciation of the difference between the essentials and nonessentials in religion. Literal and verbal points

are not of the importance which they once posses

connected with an observance of vows. It is a movement which means a larger fulfillment of the divine injunctions and better service to one's fellow-men.

CANADA AND THE UNITED STATES.

One of the ultimate results of the extraordinary land ly be the creation of an annexation sentiment which at some favorable moment may result in union between the two countries.

Far-seeing students of the situation have long believed that the annexation of Canada by the United States would in time become inevitable. There is no conviction, however, that this will be due to American initiative. The advantages arising from annexation will accrue far more generously to Canadians than to the people of the States. With certain notable exreptions, there are not many sections of the great country on our north that are desirable for farming or other purposes. At the same time there is so great an area of good farming land in this country still remaining open to settlement that the majority of Americans are content with the domestic outlook.

What is most likely to occur is along the lines of the movement now being reported in the current news. affected by our contact and prestige with the other Those fertile sections of Canada that are open to settlement will be taken up largely by Americans. The Canadians welcome American farmers more warmly since our army, fine as are its possibilities and superb than they do the English, for the reason that they A 675 profit by American progressiveness in agricultural brought into action to the same extent. methods. Every American settling in Canada is, and always will be, an ardent advocate of annexation. Many native Canadians are of the same way of thinking. They perceive that they have everything to gain and nothing to lose by union with this country. The bond that holds them to England is yearly growing weaker. The sentiment drawing them toward annex-Republic, being duly sworn, says that the actual number of ation is a natural, logical and irresistible sentiment. In time it is bound to control the situation.

> For these reasons, the American farmers now moving into Canada may properly be regarded as a body of political missionaries who will engage in the task of peacefully extending American influence on this Continent. They may well be received hospitably by the Canadian people. The best thing that could possibly happen to Canada would be annexation to the United States. The golden age of Canada's prosperity and progressiveness will begin with such a union.

> > PAUL LEICESTER FORD.

Paul Leicester Ford, whose death at the hands of his brother Malcolm constitutes a tragedy of unusual pitifulness, will live in literary annals as a prominent figure in the happily growing class of American novelists who find their best inspiration in the native life

The permanent fame of this young and generously gifted novelist will be found to rest far more largely upon his American political story, "The Honorable Peter Stirling," than upon "Janice Meredith," his historical romance of Revolutionary days. This fact is not in the least degree affected by the further fact that, possibly, a greater number of copies of the latter novel were sold. The lasting value of genuine-

Quite independently of the interest originally at taching to "The Honorable Peter Stirling" because of the gossip that the character was drawn from that of ex-President Cleveland, this strong novel of American politics won a high place from the very day of its publication. It was forceful, virile, consistent. There was an honesty and rugged worth in Peter Stirling which appealed powerfully to the American temperament and which undoubtedly militated for good in the national life. The discovery was made by authors and readers, through Mr. Ford's fine venture into the political field, that characters of great magnetism in fiction were to be found in that field. The result has been seen in the numerous political novels that have followed.

The death of Paul Leicester Ford has removed a figure of exceeding promise from American literature. Carnegie Central Library occupying and further adorn- The work which this writer had already done was a sure guarantee of increasing strength and power. Lovers of letters will deplore that the full development of such a soul in this life has been tragically pre-

> AMERICANS AS THE DOMINANT TYPE. British Consul Wyndham, stationed at Chicago, has made an official report to his Government, in which he embodies his own intelligent study of the Amer ican commercial traveler as, possibly, the most typical representative of the American in business.

> Mr. Wyndham, strangely enough for an Englishman, seems to be of the opinion that the American type of business man is superior to the English. In his consideration of the American commercial traveler and also the workingman, it is plainly to be seen that he would be gratified if his countrymen modeled themselves closely on the American. The latter is bright, energetic, not afraid or ashamed to work, not disposed to hold the profession in higher esteem than ommerce or the trades.

> "No one gets on," writes British Consul Wyndham of the men of this country, "who works with one eye on the clock, or who is unwilling to put work before his personal wishes. The American workman spends but little time in saloons, and is not interested in betting or horse racing. Many employers do not retain cigarette smokers. Athletics are encouraged in the schools, but not allowed to interfere with business in later life." Mr. Wynham also admiringly calls attention to the genial manner and the marvelous memory of the American commercial traveler.

> Only a few years ago such a report from an English Consul in this country would have been impossible. English complacency had not then been disturbed An English merchant or manufacturer felt secure in his control of the world's trade. There was no re motest thought of the peril of American competition But of recent years this competition has invaded all fields and captured trade to an extent that has alarmed the British, who are beginning to study the competitor thus so effectively proving his mettle. British Consul Wyndham's report is a phase of this English study of the American type becoming so dominant in the world's affairs.

> > USING COMMON SENSE.

Reports from Cuba are encouraging to every wellwisher of that country. The arrival of President Palma the part of his countrymen which promises much for the permanency of Cuban institutions.

For the past few days he has been traveling over the island in search of information. He has become their admiration. Evidently he has appreciated the chief fault of the average Cuban, for he has shunned every appearance of show and extravagance.

Instead of catering to this feature of the popular funcy he has manifested a degree of common sense in keeping with the best American ideals. The receptions which have been tendered to him have not been brilliant social events, but of the sort where serious

business occupied the attention of every one. There are heavy burdens for Cuba to bear. The new President realizes this fact. In his speeches and There is a gradual change in the position of church- interviews he has emphasized the necessity for econ-

men regarding the real end of religion. There is omy in every branch of the insular Government. He more of heart in the administration of those duties has determined to create as few administrative offices as possible. With reasonable salaries he expects to secure the services of efficient men.

Not the least important of his suggestions is the sending of experts to this country to learn the best agricultural methods. He intends to educate the people so that they will secure the largest returns on movement which is attracting thousands of American | their labor and capital. Industrial rather than politifarmers to settle in northwest Canada will undoubted cal measures will be employed to put the people on their feet.

With such businesslike purposes in view, it is not surprising that the party headed by General Maso has sent assurances of cordial support. This organization shows a regard for the welfare of the country in thus acquiescing in the plans of Palma. The whole situation augurs well for the future of Cuba.

THEY COME INTO GOOD COMPANY. When President Roosevelt reviewed the graduating class of the United States Naval Academy, "looking the cadets squarely in the face," as the news reports tell us, he was confronting a body of young men taking rank in the service upon which rests the greatest responsibility for the future of this country.

The American Navy is necessarily the most important factor in American history as that history is great Powers of the world. In the event of war our navy must inevitably be the supreme fighting arm, as have been its achievements, cannot hope to be

operations in Cuba were expected to be the decisive features, the navy began, most effectively maintained crannles in the rock, tumbling from ledge and triumphantly ended the war. To a tremendously greater extent must it figure in the event of hostilities with one of the more formidable Powers.

The officers and men of the American Navy whose proud privilege it was to take so distinguished a part in the war for the freeing of Cuba and the avenging of the Maine proved that they appreciated the dignity of their service as their country's most formidable militant arm. They were highly trained, ready, aggressive, organized for victory. The Annapolis cadets now just graduated into naval officers are undoubtedly possessed of this same spirit. They come into the company of a splendid line of sea fighters, past and present-the gallant American sailors whose history is one of unbroken victory in their country's behalf. They cannot fail to be animated to the sincerest devotion and the highest achievement under the flag of the Union.

Ten thousand cattle were left on the Chicago markets because the packing-houses refused to buy them unless sold at less than current prices. The stockmen claim that the action was a direct result of the combination among the packers. If the Beef Trust intends to treat cattle-raisers in this manner there will be a reckoning which will make every one responsible for such a condition suffer. No party or legal power can save a trust operated on the principles which seem to govern the large packing-houses at this time.

In the fact of the increasing tendency of great business enterprises to establish their headquarters in St. Louis there is found unmistakable proof of a widespread confidence in this city's future. The shrewd captains of industry are trained to foresee the trend of things in their world. The disposition to centralize in St. Louis means that the first World's Fair City of the Twentieth Century is expected to become one of the world's capitals of commerce and manufacture.

Chief of Police Kiely's paper, read at the annual meeting of Police Chiefs in Louisville, holding that criminals can be reformed, must be taken as expert testimony. If the professional enemy of wrongdoers discerns possibilities of good in them, surely the good must be there.

RECENT COMMENT.

Look Into Legislative Nominations.

The people of Missouri should not forget the fact tha the politicians are now naming the men to be elected to the State Legislature, and that these officials are of the greatest importance. With clean men in the Legislature many of the people's ills would vanish. This is some thing every man should look into.

Pass.

A father said unto his hopeful son, "Who was Leonidas, my cherished one? The boy replied, with words of ardent nature, "He was a member of the Legislature." "How?" asked the parent. Then the youngster saith, "He got a pass and held her like grim death." se pass? What pass?" the anxious father cried "Twas Ther-monopoly," the boy replied.

Increased the Cost of Living. Rochester Post and Express

There is no doubt that the short corn crop of last year and the consequent high cost of feed this year has justified some advance in the price of beef. But it is also true that a combination has been formed among the great packing establishments of Chicago and other Wester cities and that the price has been advanced more rapidly and to a greater degree than circumstances warranted This combination is certainly in violation of the antitrust laws of the country, and it is now the duty of the Attorney General of the United States to prosecute the offender and bring them to punishment. Their offense is a very serious one. They have unjustly and arbitrarily creared the cost of living to every inhabitant of this

Oppressed Womanhood.

A trim, well-dressed woman, the typical American woman-self-possessed, fearless-approached her husband who was furning because he could not pass on to the dock and attend to the detail of freeing her baggage, and confidently asked for \$1,400. A trifle surprised, the band asked, "How much?" "Fourteen hundred" was repeated as confidently as though she were asking for 1 cents. "Well, my dear, I do not travel about New York ount in my pockets." A shade of disappointment and surprise clouded the wife's face for a m mert. "Tell them to put your traps in store. I'll attento the matter to-morrow. "Must I leave them here? "Yes: I'm afraid you must. Come, hurry; let's get out of this. I telephoned for luncheon, and have ordered a carriage for a drive. Come, the duds will keep." A few minutes later, like lovers, they passed out of sight.

Electronic Theory of Electricity.

Maxwell's theory that electric and magnetic effects a due to strains and stresses in the other rendered an in-telligible account of electric phenomena, so to say, in chamber has been fitted up as a ballroom. empty space, and its verification by Hertz placed on a firm basis the theory that the agencies we call electric and magnetic force are affections of the ether. But the complications introduced by the presence of matter in

on of an idea originally due to Weber, does not invalidate the ideas which lie at the base of Maxwell's theory, but it supplements them by a new conception, viz. that of the electron or electric particle as the thing which is moved by electric force and which in turn gives rise to magnetic force as it moves. The conception of the electron as a point or small region toward which lines of more plausible. This cave is said to constrain the either conversal rates the conversions. the ether converge necessitates the correlative motion of positive and negative electrons. We are then led to ask whether the atom is not merely a collocation of electrons. If so, all mechanical and material effects must be translated into the language of electricity.

CAVE HUNTING IN MISSOURI STIRS LOVE FOR ADVENTURE

Hu. Is of Unexplored Underground Crevices Throughout the State Afford Opportunities for the Pursuit of Pastime Found by Its Followers to Be More Alluring Than Mountaineering-Formation of Caverns, Their Deposits and How to Traverse Them.

BY HORACE KEPHART,

but under the earth all is new. That is Even a personally-conducted trip through some cave that has long been known to the public, and has been bridged, laddered and safeguarded, is attractive in its way. But such experience is tame compared to that of venturing into a cavern that no other mortal has entered. We love novelty, mystery, marvels, adventure, discovery; and all of these passions are stirred when we peer into the mouth of an unexplored cav

What lies within that dark portal? Treasure hidden by bandits? Veins of precious ore? Vast chambers, perhaps hung with weird pendants, walls glittering with crystals, forests of stalagmites, columns of alabaster of rought into action to the same extent.

Even in the conflict with Spain, where the land that died ages before man was born; living species unknown to the upper world. There may be dripping springs trickling through to ledge in fairy waterfalls, and gathering far below into a subterranean river that

> We are tempted to enter and fathom this mystery. Ours shall be the first human fee to tread this new domain; ours the first voices to disturb its silence. To go where no other man has been, to see what no other man has seen-who can resist such oppor-

Yet at the first step we pause. What lies within? Foul reptiles, perhaps, or savage beasts; snakes, spiders, centipedes, nasty bats, wolves, bears—or scaly antedituvian monsters, long belated underground, and still snapping their fangs in these Plutonian

Quickly we brush aside such silly fears but they are followed by forebodings of real dangers. We think of fire-damp, pit-falls, slippery ledges, hazardous passages over gulfs that no torch can fathom stones falling from overhead, rotten rock crumbling in our grasp. The rope may snap. We may crawl into a tunnel so narrow and crooked as to wedge us fast. The cave is a labyrinth, no doubt. Its passages wind in and out, up and down, corkscrew-ing, opening into each other in the most bewildering way, or ending in blank walls or impassable flasures. A compass is of little use in such a maze. The lantern can-not guide us a hundred feet. On our return we may find several openings fro one chamber and not know through which we came. We may stumble and fall. The light may go out. We may be too wet to strike a match. We may be lost in the bowels of the earth!

Why the Cave Fascinates.

So the cave alternately attracts and re-pels a novice. It fascinates. But after one has served his apprentice ship underground, the phenomena common to ordinary caves do not impress him, un less they be on an unusual scale. His im agination is tamed, and his nerves are steadled. He no longer expects marvels, nor does he fear that a dragon may snatch him from behind. Keenly aware of th real perils of such venture, he prepares for them with the forethought of an engineer. Lightly but thoroughly equipped, he hores into the unknown as coolly as he would bite off the end of a cigar. It may be that he is urged by a prospector's zeal, or by the enthusiasm of scientific research. But the most ardent of cave hunters are they the most ardent of cave hunters are they who explore the under world from simple love of hdventure. The'rs is a passion analogous to that of the Alpine climber, who enjoys "earth's high places." The risk, the fatigue, the mental strain—these are nothing. After them shall come the soothing sense of dangers well faced and of difficulties overcome. "It is good to feel

In truth, cave hunting is a more alluring and more satisfactory sport than mountaineering. Most mountains have already . To find one that has neve ocen ascended, you must travel thou of miles and expend a small fortune. But mentered caves are not uncommon Missouri alone there are hundreds that no human being has ever explored.

Our whole Ozark region is a network, underground, of crevices, galleries and cham-bers. This Ozark formation covers nearly all of Missouri south of the Missouri River. and extends through western Arkansas into the Indian Territory. Its hills reach the Mississippi a few miles south of St. Louis and form almost continuous bluffs along the river as far South as Commerce. As steen hills or plateaus, the O ward to the Kansas line. Anyone who traverses this recton, if he

ology, can tell at once that it must be a district rich in caves. He will notice first and that it is generally porous or He will see some fine rivers, but will be sur prised by the almost total absence of brooks. Springs are not so common as one would expect in a hilly country. In sum mer one may travel for a day through very rugged parts of the Ozarks without finding water. Yet there are in this region a few springs of truly elegantic proportions A typical "big spring" of this class boils out of a hillside and fills a crater perhaps a hundred feet in diameter. Its surface is as blue as indigo. Its water is so clear that, by immersing your face, you can see the white bottom fifty feet below. Its out let is strong enough to turn a mill, and forms at once a creek navigable by canoes. Such are the St. James Spring on the Mer amec, Round or Blue Spring on the Current River, Bryce's Spring on the Niangua, and

In the Orark Region.

All this tells a plain story. There are no brooks, and few small springs, because the surface rock is so porous and fissurain almost immediately seeps or through if to a deep underground channel The great springs are outlets of subter ranean rivers. Now, since underground water courses shift and change more rapidly and more eccentrically than surface streams, so it must be that many of these old-time channels have been left almost or nuite dry. Hence the Ożark region must b full of caves,

So the opportunities for cave exploration are exceptionally rich in the Ozarks. Ther are hundreds of caverns in Missouri that have been wholly or partially ex-plored, and other hundreds that have neve blored, and other hundreds that have never been entered. Among the known caves that will repay a visit, and are safe for novices there are several within a few hours' run of St. Louis. There are two near Sullivan, in Franklin County, that the electric and magnetic fields presented immense diffi-culties which Maxwell's theory was not able to over-come.

The electronic theory of electricity, which is an expan-sion of an idea originally due to Weber does not invalid.

Store In Lincoln County, near the Culvre, are several fairly large caves, and on Sul-phur Fork of the Culvre is a cave and natural bridge.

Sim's Cave, on the Mississippi, a few sign of an idea originally due to Weber does not invalid.

tain an underground river that can be crossed only by a boat. Little is really known about Sim's Cave, save that it is large and deserves thorough exploration. the head of Snell Hollow, two miles south

of Brickey's Mill Landing, on the Missis-Librarian of the St. Louis Mercantile

Library.

There may be nothing new under the sun, but under the earth all to new That is but under the earth all is new. That is why caves interest all classes of people. Even a personally-conducted trip through some cave that has long been known to the waterworn, but seemingly split apart by some subterranean force. What appears to be the main passage corkscrews down to an unknown depth.

North of the Missouri.

Caves are not numerous nor large north of the Missouri. McDowell's, two miles below Hannibai, is famous from the grew-some experiments of Doctor McDowell in trying to petrify the corpse of one of his relatives by leaving it in the cave. Fisher's Cave, on Spencer's Creek, in Rails County, is tolerably large. There is a deep cave on Salt River, in Pike County. The Tavern Rock, near Centaur, on the Missouri River, was mentioned by Lewis and Clork as a fa-vorite rendezvous for Indians and trappers, and as being covered with Indian "gods" and hieroglyphics. It is only a very large shelving rock, with fiscures that may lead to a cave within. The Indian pictures have long since been obliterated.

South of the Missouri is our great cave district. Friede's, on Cave Spring Creek. in Maries County, is much frequented, and has been followed for several miles. There is a large one on Tavern Creek, in Miller County. Conner's, eight miles northwest of Columbia, is said to have been explored for eight miles. There are several small caves along the Gasconade, especially in Pulaski County. On the Current River, in Shannon County, are a number of caves, some of them apparently large, and there are many in the surrounding mountains, which have been resorts of moonshiners and other people of a retiring disposition

the southwestern part of the State, par-ticularly in Stone and Greene counties. The famous Marble Cave, forty miles from Marionville, contains a chamber 350 feet long, 125 feet wide, and 195 feet high, by actual measurement. Its galleries have been followed for many miles, and to a depth of 400 feet below the surface. Only three miles away is the exquisitely beautiful Fairy Cave, which is entered through a sinkhole 100 feet deep. There are said to be over a hundred caves in Stone County alone, one of which, in the southern part of the counsed to be at least as large as

In Greene County, not far from Springfield, the Knox. or Percy, Cave, is of remarkable beauty. Fisher Cave near Galloway, is also notable. The Smallen, or Foundain, Cave, on the Finley River, was described by Schoolcraft as early as 1818. Mason Cave, at Ash Grove, deserves mention. There are several very large caves in Mc-Donald County. In Christian County, near Ozark, a stream enters a sinkhole, passe for three-quarters of a mile through a cay ern and reappears through an opening 60 feet high and S feet wide. There are large caves to the south and southwest of Ozark. In Ozark County there is a cave of considrable interest on Bryant's Fork.

Caverns in Southern Illinois. Southwestern Illinois is also rich in cav-erns. The largest and the most accessible from St. Louis is entered on the farm of from St. Louis is entered on the farm of Frederick Eckert, near Burksville, sixteen miles from Red Bud. It is said to have been explored fourteen miles in one direction and six miles in the other direction, without finding either end. It contains a large lake and a river in which there are blind fish. It has scores of rooms, some of which are of vast dimensions. The passage through the contains a large lake and a river in which there are blind fish. It has scores of rooms, some of which are of vast dimensions. The passage through this cavern is fairly easy so far as it has been explored.

In order that one may intelligently explore a cave he should understand how caves are formed. The popular notion that they are formed. The popular notion that they are caused by volcanic forces is erroneous. A far gentler agency creates them. Limestone difficulties overcome. "It is good to feel that every manly quality in you has been strained to the uttermost, and that it has have been a forest covering the region to have been a forest cover which is essential. provide a bed of leaves, which is essential in the chemical process that follows. Leaves give out carbonic acid—the same gas that is used in soda fountains. Rain, falling the leaves, absorbs enough carbonic acid to make a weak liquid acid that dissolves lime. This acidulated water, seeping into crevices in the limestone, eats out mi ne and leaves behind only a shell of the original rock. Thus the cracks in the surface rock gradually widen and deepen. When the rainwater reaches an underlying bed of sandstone, or of some other rock

that is not easily dissolved by carbonic acid, its downward course is stayed. Then, under pressure from above, it begins eating and cutting a more or less horizontal course along this underground drainage plane. This mining process is hastened by don. Wherever there is a crack or large enough to admit a considerable rill of water, sand and gravel are carried be-low, which, being whiried about in the vortex of water, rapidly cut away the wall of the cave bed. Nodules of flint, washed out from the honeycombed rock above, lend powerful aid to this erosive process. Thus

in time a large chamber is excavated below the main fissure and an underground river finds its channel to some lower drainage level, which may be many miles away. When a cave chamber forms near the surface of the ground its arch or vault may gradually weaken until it can no longer gradually weaken until it can no bages sustain the weight overhead. Slowly some of the rubbish thrown to the floor of the chamber is pulverized and washed away. The edge of the crater wears smooth. The result is finally a funnel-shaped cavity in the earth that we call a sinkhole.

Sinkholes in the Suburbs. Every St. Louisan has noticed the big sinkholes in outlying parts of the city. They are especially numerous in the neighbor-hood of Jefferson Barracks. Every one of these sinkholes is, or once was, the en-trance to a cave underneath. If the sink olds water, then the shaft leading to the cave has been plugged up, or perhaps the cave itself has filled up. If the sink does not hold water, there is still a cave, and

not hold water, there is still a cave, and an underground watercourse beneath it.

I have spoken of caves filling up. Strangely enough, the very process that hollows out a cavern has a tendency to fill it up again. Every one who has visited a cave worth seeing has noticed the stalactites hanging from the celling, and stalagmites rising from the floor directly beneath them. They are formed in the following manner:

The vault of a cave chamber is seldom dry. Water still seeps very slowly through

iry. Water still seeps very slowly through t. Now, when acidulated water pours through a crevice in little rills, it has a cutting and cating effect upon the rock, as described above. But where there is no crack, and it seeps slowly through a cave roof, and falls drop by drop, each drop remains long enough upon the ceiling to deposit a little of its dissolved lime upon the celling of the room, in the form of a ring. The next drop deposits another layer, and so on. Thus there is built, at first, a and so on. Thus there is built, at first, a siender tube of soft lime, resembling a pipestem. By and by this tube fills up and hardens. Thereafter it grows on the out-side, both in thicknes sand in length, and forms a stalactite. Mineral matter down with the lime may form colored lay-

Meantime, every drop when it strikes the floor leaves a little more of its lime at the from the floor a stalagmite, which is the inead. In time the two may join and form a column, and in further time the whole chamber may be refilled by the same pro-

cers that chiefly evacuated it. Most of the caves that have been exsage indicates that this was once the drainage outlet of the cave, but that subsequently the water found passage down through the original cave-bed, worked on down through the next stratum of limestone.

found a new bed of hard rock, and now flows through a lower gallery. In this case the upper gallery may be comparatively dry but there will be deep fissures and guifs within, leading to the lower gallery, where the main body of water flows.

How to Make Expeditions.

A beginner should first gain some experience in caves that can be easily entered through such a horizontal passage. Him first trip should be in company with a guide, Everybody is nervous on his first expedito underground, and no one has any business in an unknown cavern until he has conquered fear. In exploring a new cave you may come to a difficult passage or to a narrow and tortuous crevice where your companions can be of no assistance. If your nerva

falls you there, you are a "goner."

When a new cave is to be entered, take not more than three companions. A larger party confuses everybody with its rever-berating babble, discussions as to the best route will arise, and the larger the party will flunk.

Wear old clothes of course. You are like, ly to get maddy from head to foot. Don't wear a broad-brimmed hat. Gloves are almost indispensable, for without them your hands are sure to be incerated if there is much climbing. In my opinion, rubber thigh boots are a nuisance. I would rather get wet from wading than from perspiration Wetting cannot hert you in the air of a eav

Acetylene lanterns give the best light Carry spare carbide. Every man should also carry a few candles; if not otherwise needed, they are useful to leave at points where the return passage may be in doubt, or to mark articles left behind. Everybody in the party should have his own lanters still, waterproofed themselves by dipping them one at a time into melted paraffine. Carry some spare matches in your vest pocket, where you can get at them if, perchance, your lantern upsets while you are

crawling through a narrow passage.

It will be well for each man to carry fifteen or twenty feet of one-half-inch rope, previously well stretched. These sections can be joined together for deep descents. A guide-line is a good thing, but bother some Card is now put up to these so that ome. Cord is now put up in tubes, so that it unreels itself without danger of tangling. This is the best form of guide-line, and should be carried and let out by the last man of the party. Remember that a guideline is not to be depended upon to lend you out of the cave if your light goes out. It crosses some gulf or has slipped down from

a narrow ledge.

Carry enough lunch for two meals. Take along a cord for lowering a lantern (one of the lanterns should be of the common type for such purpose). It is a good scheme to wrap a bit of sandpaper in sheet rubber and stow it in your inside vest pocket, for and stow it in your inside vest pocket, or you and your surroundings may be so wet that you cannot otherwise strike a match. Magnesium ribbon or wire is excellent for illuminating large chambers, and in seek-ing the bottom of abysses. Somebody ing the bottom of abysses, Somebody should carry a cup, as you may have to drink drip water. A dip-net for catching blind fish, etc., should be in the outfit; also a cold chisel, a light hammer, and little bags to keep specimens separated and labeled. A flask of brandy may not come amiss; and, of course, no smoker will forget his tobacco. This is all the outfit need-ed under ordinary circumstances. Stow it as compactly as possible, and as get-at-able as compactly as possible. I may as well say that the mountaineers' practice of tying all members of a party to a long rope is quite impracticable in caves. The way is often so tortuous that such a rope would be a tortuous that such a rope would be a nulsance, if not a positive source of dan-

Beware of Cave Miles. In estimating distances, beware of "cavmiles." A cave mile is usually only a few hundred yards long. Heights, ,depths and widths are also very deceptive by lantern light. The public does not want fairy tales about your adventures. It wants the truth. Do not be afraid of fire-damp, unless you are going down a sinkhole. The air of a true cave is purer and more invigorating than can be found on earth, save in the midst of a desert. One can work with less fatigue in a cave tim in the open air. The temperature of a given cave is con-

stant the year round; but that of different caves varies from 42 degrees to 60 degrees.

The chance of finding caverns that no one else has ever entered is now alm limited to such as can be found only by descending deep sink-holes. This is diffi-cult and risky work. A windlass must be rigged at the pit's mouth. All loose ston must be removed from a for a pebble falling from a considerable height may kill a man as easily as a bullet. There should be four men outside; three to work the windiass, and one to manage the signal-cord. The explorer sits in a boatswain's chair at the end of the rope, and is tied fast by the left ankle 20 a stirrup. The signal-cord is tied round his waist, and a simple system of signals is agreed upon, similar to those used on agreed upon, similar to those used on street cars. He carries a crook or a stick like a boat-hook, with which to push away from ledges or draw himself to them. Before descending, a weighted ball of cotton waste, saturated with oil, is ignited and thrown down, to guard against fire-damp.

Such work takes nerve, but it promises important discovery. Ordinary sink-holes seldom go down more than 100 or 150 feet, 600 feet without finding bottom, and the Devil's Hole near Fordland, Webster Counto strike bottom.

Commercial Product of Caves. The chance of finding mineral veins in

caves is lessened by the fact that the walls of limestone caves are coated with an incrustation of dripstone. Hence there is no "bloom" to attract the eye. Still, lead caves have been found near Dubuque, and elsewhere, and fortunes have been made by working them as mines. Incidentally, I may as well say that there is no geological indication that the precious metals will ever be discovered in Missouri in paying quantities. The chief commercial product of caves, up

to date, is onyx, which is a fine-grained and translucent variety of dripetone. Occasionally the so-called "cave pearls," found in shallow pools where they have been polished by attrition, have been set as gems. Saltpetre, ochre, the sulphates of soda and magnesia, and guano are also found in caves. In 1869 some workmen who were

deepening the channel of the Mississippi, near Rock Island opened a small cave that was completely lined with metal that glie tered like yellow gold. The workmen, poor fellows, enjoyed for a day or two the most extravagant visions of wealth, but their find proved to be only "fool's gold," or iron pyrites.
The animal life of caves is peculiar. It

includes transparent fish, white cravfish, cave lizards, white rats, cave crickets and so forth-all blind and some of them quite eyeless-and bats, of course, which are by no means blind. Snakes are never met is caves, save in the rare instance where one may have fallen down a sinkhole and could not get out. Wolves and bears sometimes use the mouths of caves for dens; but there are few left in Missouri.

Digging in the floors of caves, near the

entrance, for relics of prehistoric man is the entrance, for reacs of prehistoric man is the easiest and most promising field of cave ex-amination. It has long been a favorite branch of science in Europe, but compara-tively little of this work has been done in America. A friend of mine, some years ago spent his vacation digging for flint imple ments, etc., in some caves on the Gascon-ade and Osage. Although his time was short and he had little help, his finds were enough to warrant further search by a bet-

ter-equipped party.

In Europe, cave hunting is recognised as a distinct branch of science, as well as a distinct sport. The science of cave explora-tion goes by the name of speleology. It has a literature of its own, and in Paris there is a Societe de Speleologie for the encour-agement of cave research. It is interesting to know that the only woman memb this society is a Missourian, Lucila Agnes Owen, who in 1898 published a little volume on the cave regions of the Ozarks and the